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MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

**TCP3151 – INTEGRATIVE PROGRAMMING AND
TECHNOLOGIES**
(All sections / Groups)

28 May 2019
2.30PM – 4.30PM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 7 pages excluding the cover page.
2. Attempt all FIVE questions.
3. All questions carry equal marks and the distribution of the marks for each question is given.
4. Please write your answers in the Answer Booklet provided.

QUESTION 1 (10 MARKS)

- a) A compiler is a computer program that transforms code written in a high-level programming language into the machine code. State the differences between the native compiler and cross-compiler along with the diagrams.
(4 marks)

- b) The distributed client-server system consists of several layers. List **THREE** (3) layers in the distributed client-server systems.
(3 marks)

- c) COM (Component Object Model) is a Microsoft specification that defines the interaction between components in the Windows environment. List **THREE** (3) advantages of COM.
(3 marks)

Continued...

QUESTION 2 (10 MARKS)

- a) Compiler and Interpreter are two different ways to execute a program written in a programming or scripting language. State **FOUR** (4) differences between Compiler and Interpreter.
(4 marks)

- b) Thin-client model and fat-client model are used in two-tier client-server architecture. State the differences between the thin-client model and fat-client model along with the diagrams.
(4 marks)

- c) In distributed computing, an Object Request Broker (ORB) is a middleware which manages interaction between clients and servers. State any **TWO** (2) of the roles played by Object Request Broker (ORB) in the reference model.
(2 marks)

Continued...

QUESTION 3 (10 MARKS)

- a) You are required to write a well-formed Extensible Markup Language (XML) document based on the information given below.

“A car with car plate number is MCC2117, brand is Proton, model is persona 1.5, country is Malaysia, released on 2011.10.22 and price is RM60000.”

You are freely to name the tag element where the name of the tag element must follow the standard naming rule.

(4 marks)

- b) The event list has:

- The name of the event list is root element.
- It has three sub elements; event title and a list of students involved.
- A list of students involved, each student has name and email address.
- Event title consists of attribute of event code

Write a suitable Document Type Definition (DTD) in defining the event list based on the above format.

(4 marks)

- c) What is the purpose of using XML declaration in the XML document? State a specialty of XML declaration when it is used in the XML document.

(2 marks)

Continued...

QUESTION 4 (10 MARKS)

- a) Given the XML document, fill in the incomplete XSLT code to display the information of name and capacity of all restaurants in the HTML output.

XML document:

```
<?xml version="1.0"?>
<report>
  <restaurant>
    <name> La Pasteria</name>
    <capacity>300</capacity>
    <state>Selangor</state>
  </restaurant>
  <restaurant>
    <name> Baba Nyonya </name>
    <capacity>150</capacity>
    <state>Melaka</state>
  </restaurant>
</report>
```

XSLT code:

```
<?xml version="1.0"?>
<xsl:stylesheet version="1.0" xmlns:xsl="http://www.w3.org/1999/XSL/Transform">

  <xsl:output method="html"/>
  <xsl:template match="/">
    <html>
      <body>

        <!-- Write your code here -->

      </body>
    </html>
  </xsl:template>
</xsl:stylesheet>
```

(4 marks)

Continued...

- b) You are instructed by your department head to join the software design team of a recent project. Your team member has finished some of the XML design based on the requirement from the client. Construct the logical view of the XML document below so that you can report the progress of your project in next meeting.

```
<?xml version="1.0"?>
<shop>
    <lego code="31066">
        <name>Space Shuttle Explorer</name>
        <category>Creator</category>
        <pieces>285</pieces>
        <release_date>1 June 2017</release_date>
    </lego>
    <lego code="41108">
        <name>Heartlake Food Market</name>
        <category>Friends</category>
        <pieces>388</pieces>
        <age_range>6-12</age_range>
    </lego>
</shop>
```

(4 marks)

- c) Based on XML given below, suggest a suitable attribute type to declare the attribute of “passport_num” in DTD. Provide **ONE (1)** reason to support your suggestion.

```
<?xml version="1.0"?>
<individuals>
    <name passport_num ="a8904885">Alex Kok</name>
    <name passport_num ="a9011133">Sarah Tan</name>
</individuals>
```

(2 marks)

Continued...

QUESTION 5 (10 MARKS)

- a) You are a senior programmer in a software company. Recently, your department head plans to develop a project that involves an interoperation of Java with native shared library file written in C programming language. You are asked by your department head to give some opinions on the selection of the programming language regarding to this project. What is your suggestion? Also, provide **TWO (2)** reasons to support your opinion.

(3 marks)

- b) You are one of the members in programming team to design a system involved the use of JNI programming language. You have finished your task by writing the JNI code to update the value of instance field from its original number to 3.89 as shown below. However, you are advised by your team leader to use the static field instead of instance field. Rewrite the codes according to your team leader advice.

```
//CTestV.c
#include "jni.h"

JNIEXPORT void JNICALL Java_TestV_update (JNIEnv *env, jobject obj){

    jfieldID fid;
    jdouble value;
    jclass cls = (*env)->GetObjectClass(env, obj);

    fid = (*env)->GetFieldID(env, cls, "num", "D");
    if (fid == NULL) return;

    value = (*env)->GetDoubleField(env, cls, fid);
    printf("The original number = %fn", value);

    (*env)->SetDoubleField(env, cls, fid, 3.89);
}
```

(3 marks)

Continued...

- c) Given the code of Test.java and incomplete code of CTest.c. Fill in the empty portion of code CTest.c that performs the array copying and output displaying.

```
// Test.java
class Test {
    private native int total(int[] arr);

    public static void main (String [] args){
        Test p = new Test();
        int arr[] = new int[8];
        for (int i=0; i<8; i++){
            arr[i] = i;
        }
        int sum = p.total(arr);
        System.out.println("sum = " + sum);
    }
    static{
        System.loadLibrary("CTest");
    }
}
```

```
//CTest.c
#include <jni.h>

JNIEXPORT jint JNICALL Java_Test_total(JNIEnv *env, jobject obj,
jintArray arr)
{
    jint buf[10];
    jint i, sum = 0;

    // write your code here (array copying and output displaying)

    return sum;
}
```

(4 marks)

End of Paper